

Non-Point Source Planning for the Delaware River Basin

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Abstract

The Delaware River Basin Commission (DRBC) is an interstate agency that manages the water resources of the Delaware River Basin. In the early 1990's, DRBC adopted Special Protection Water (SPW) regulations to protect the high quality waters located on the Delaware River above the Delaware Water Gap to Hancock, New York. These regulations focused on controlling both point and non-point source discharges to maintain existing water quality in the river. The main mechanism to control non-point sources in the SPW regulations was by requiring applicants located in the drainage area of SPWs to develop a site-specific Non-point Source Pollution Control Plan (NPSPCP). The NPSPCP is to describe the Best Management Practices that will be used at the project site and service area to control the increases in non-point source pollutant loadings resulting from the project. Since many projects fall below the DRBC review threshold and the plans are adopted on a project by project basis, the original SPW regulations had limited application. DRBC is currently revising these regulations to increase the effectiveness of the non-point source component. While DRBC will continue to require applicants to develop a site-specific NPSPCP, the proposed regulations encourage the development of Area-wide Plans on a municipal, multi-municipal, county, or watershed basis that contain a strategy for managing, controlling, and abating non-point source loadings within the geographic area of the Plan. Through the development of Area-wide Plans with a non-point source component, a greater portion of the drainage area of the SPWs will be implementing non-point source controls that will protect the high water quality of the Delaware River. DRBC is also revising the SPW regulations by adding design principles and minimum requirements for the NPSPCP to control the rate, volume, and quality of stormwater generated by new development. Concurrently, DRBC is writing a guidance manual to assist applicants in complying with the SPW regulations. By revising the SPW Regulations to encourage the development of Area-wide Plans and adding minimum requirements for NPSPCPs to control stormwater, DRBC is taking action to more effectively control non-point source pollutant loadings in the drainage area of SPWs. This effort will help us meet our goal of maintaining existing water quality in SPWs.

Background

1. **DRBC History.** The Delaware River Basin Commission (DRBC) was founded in 1961 to manage the water resources of the Delaware River Basin. President Kennedy and the governors of the four basin states (Delaware, New Jersey, Pennsylvania, and New York) for the first time signed concurrent compact legislation into law creating a regional body with the force of law to oversee a unified approach to managing a river system defined by the watershed and not political boundaries. At the time of DRBC's inception,

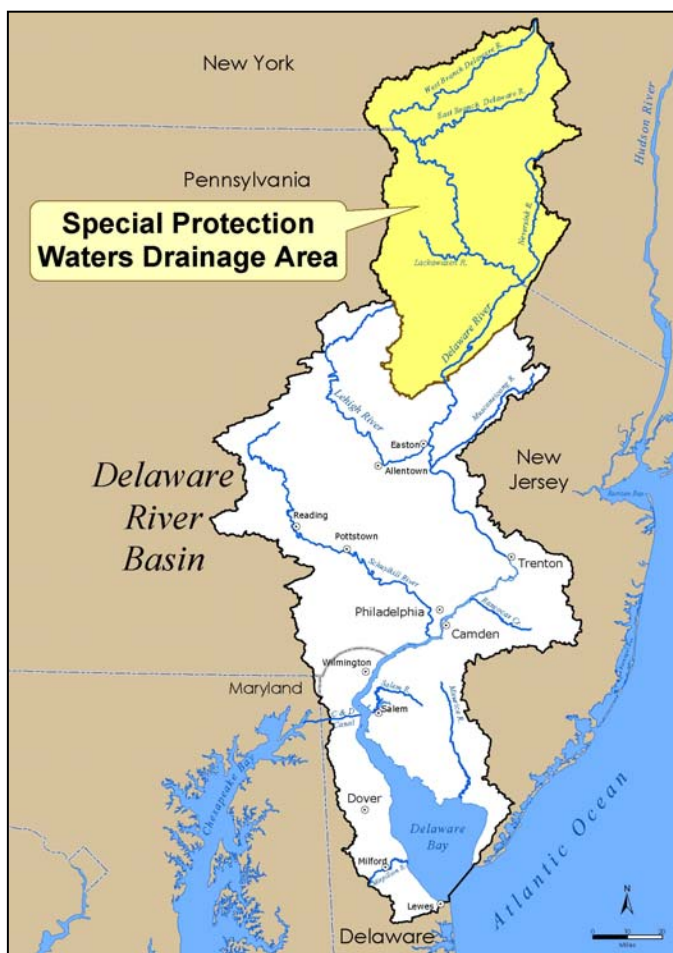


Figure 1. Delaware River Basin

the water resources of the basin were subject to duplicating and uncoordinated efforts of 43 state agencies, 14 interstate agencies, and 19 Federal agencies with multiple duties, authority, and responsibility. This was the first time that the federal government and states joined together as equal partners in an agency to manage the river basin through planning and regulation (DRBC, 1961).

The Delaware River basin shown in Figure 1, consists of 330 miles of river from the headwaters near Hancock, NY to the mouth of the Delaware Bay with an approximate drainage area of 13,500 square miles. The basin is made up of four states and two EPA regions. Over 17 million people rely on the Delaware River basin for their water supply.

The Commission consists of the governors of the four basin states and the President. The five members appoint alternate

commissioners with each commissioner having one vote and a majority required for most issues. The Commission programs consist of the following: water supply planning, water quality protection, watershed management, flood protection, recreation, and regulatory review (DRBC, 1961).

2. History of Special Protection Waters Designation. The Commission adopted *Water Quality Regulations (Regulations)* in 1962 as part of its water quality protection program. As necessary, the *Regulations* have been updated over the years. Prior to 1992, the *Regulations* and the water quality program focused on raising water quality to meet criteria, as was done in the estuary for dissolved oxygen by requiring plants to upgrade to secondary treatment and by issuing wasteload allocations to dischargers in the estuary for 20-day carbonaceous biochemical oxygen demand. The *Regulations* did not include a classification for high quality waterbodies that require additional protection.

In 1978, the 73-mile stretch of the Delaware River from Hancock, NY to Milrift, PA and the approximately 40-mile stretch of the River from just south of Port Jervis, NY downstream to the Delaware Water Gap near Stroudsburg, PA were added to the National

Wild and Scenic Rivers System by Congress as shown in Figure 2 (DRBC, 1978). These are referred to as the Upper and Middle Delaware Scenic and Recreational Rivers, respectively. In 1988, the Commission and the National Park Service began developing a water quality protection plan for the Middle Delaware Scenic and Recreational River and tributaries within the boundary of the National Recreation Area, to protect the River from water quality impacts due to potential growth in that area.



Figure 2. Waters added to the National Wild and Scenic Rivers System

In 1989, the Watershed Association of the Delaware River petitioned the Commission to protect the high quality waters of the Delaware River from Hancock, New York to the Delaware Water Gap from degradation. As a result of this petition, the Commission staff, the public, and the Commission's Water Quality Advisory Committee, which is comprised of representatives from the states, EPA, environmental professionals, the regulated community, and academia, began to develop regulations to protect high quality waters. Concurrently, DRBC expanded its existing water quality monitoring program in the Upper and Middle Delaware and combined this with historical data from U.S. Geological Survey (USGS), New Jersey Department of Environmental Protection (NJDEP), New York Department of Environmental Conservation (NYDEC), and Pennsylvania Department of Environmental Protection (PADEP) to define

existing water quality. On December 9, 1992, DRBC amended the *Regulations* to include the policy that "there be no measurable change in existing water quality except towards natural conditions in waters considered by the Commission to have exceptionally high scenic, recreational, ecological, and/or water supply values" (DRBC, 1996). These waters could now be designated as Special Protection Waters.

Through this amendment, the 121-mile stretch of the Delaware River from Hancock, NY to the Delaware Water Gap was designated as Special Protection Waters including the 8.3 mile reach between the Upper and Middle Delaware. Portions of the tributaries located within the river corridor of the Upper Delaware Scenic and Recreational River and the

portions of the tributaries within the Delaware Water Gap National Recreation Area as shown in Figure 3 were also included.

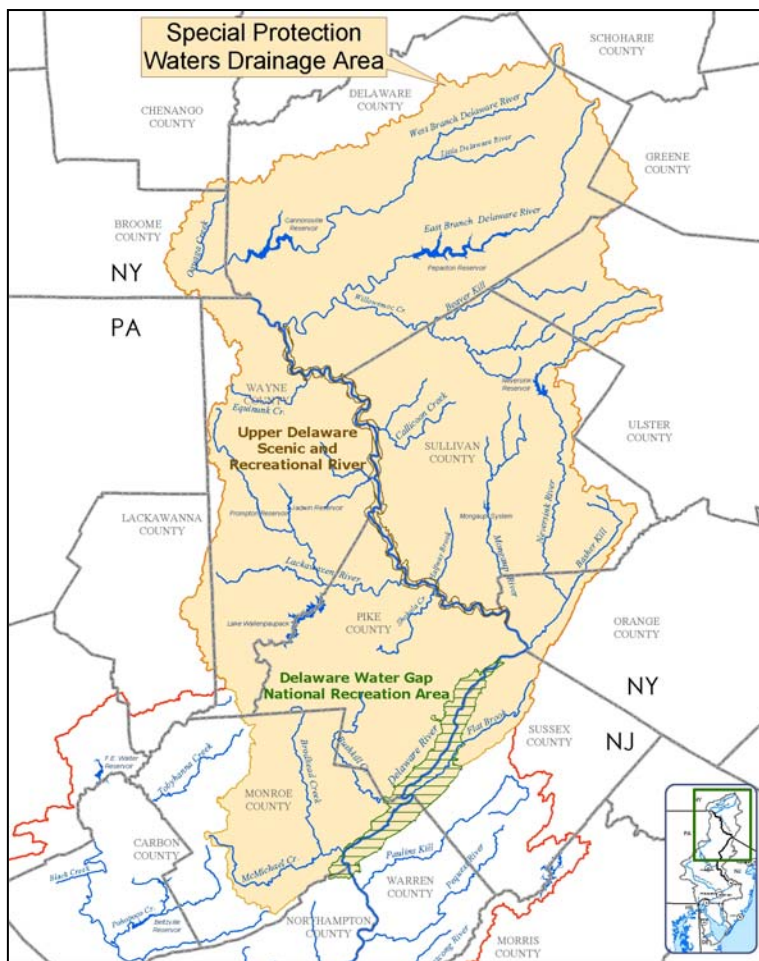


Figure 3. Designated Special Protection Waters

Current Non-point Source Regulations in Special Protection Waters

The regulations adopted in 1992 focused on controlling point sources of pollution to maintain existing water quality. On February 23, 1994 DRBC amended the *Regulations* by adding requirements to control non-point sources of pollution in the Special Protection Waters. One of the main mechanisms of the *Regulations* to control non-point source pollution is the requirement that projects located in the drainage area of Special Protection Waters subject to Commission review (discharge projects with a design capacity of at least 10,000 gpd or withdrawal projects when the daily average gross withdrawal during any 30 consecutive

day period exceeds 100,000 gallons) submit for approval a Non-Point Source Pollution Control Plan.

Non-Point Source Pollution Control Plans

In the Non-point Source Pollution Control Plan (NPSPCP), applicants were to describe the Best Management Practices to be used at the project site and in the project service area to control increases in non-point source pollutant loadings resulting from the project. The regulations however, did not specify design principles or minimum requirements that applicants must use. The regulations were also silent on impacts to the waters from the increased rate or volume of stormwater generated at the project site or service area.

Proposed Non-Point Source Requirements for Special Protection Waters

DRBC staff and the Water Quality Advisory Committee have been working on a revision to the *Regulations* including a major revision to the Special Protection Waters section. The impetus for the changes was to clarify sections of the rule and to make the regulations more effective at addressing non-point source pollution. The original definition of Best Management Practices (BMPs) was limited to “structural or non-structural measures designed to reduce stormwater runoff and resulting non-point source loads” (DRBC, 1996). In the proposed regulations, the definition is expanded to emphasize that non-structural measures can include activities or procedures that reduce stormwater runoff and resulting non-point source loads. DRBC is trying to encourage low impact development and preserving the natural landscapes over using structural BMPs.

In the proposed revisions to the *Regulations*, the goal of the NPSPCP has been expanded to not only control the increases in non-point source pollutant loadings from the project site and service area, but also to specifically control the rate, volume, and quality of stormwater runoff generated from construction and/or land use changes associated with the project. DRBC decided to focus on controlling stormwater runoff when developing design principles because it generates the majority of non-point source loads. Stormwater affects the in-stream water quality either by transporting pollutants that wash off of deposited particles from impervious surfaces or through streambank erosion caused by the higher flows (MDE, 2000). DRBC is also emphasizing infiltration methods rather than simply detaining the stormwater runoff generated. The goal is to maintain the pre-development groundwater recharge since groundwater provides base flow for streams and is often used for water supply.

Design Principles and Minimum Requirements

In developing the design principles and minimum requirements, DRBC researched progressive work that has been done in the area of stormwater management. DRBC staff referred to the *2000 Maryland Stormwater Design Manual, Volumes I and II* (MDE, 2000), the *Brodhead and McMichaels Creek Watershed Act 167 Stormwater Management Plan Update Final Draft* (Monroe County Planning Commission, 2003), *Stormwater Management Ordinance No. 123-2001 of Pequea Township* (Pequea Township, 2001), *The New Jersey Stormwater Best Management Practices Manual, January 2003 Draft* (NJDEP, 2003), and Pennsylvania’s *Comprehensive Stormwater Management Policy* (Commonwealth of Pennsylvania DEP, 2002).

1. **Design Principles.** Under the proposed regulations, applicants shall develop the NPSPCP with the following design principles:

1. Maintain or restore the natural hydrology of the site
2. Preserve natural landscapes
3. Minimize site disturbance
4. Maximize pervious areas and maintain existing infiltration
5. Utilize non-structural BMPs before structural BMPs
6. Protect stream channels from degradation (e.g. scour, streambank destabilization)

7. Prevent increased flooding or erosion due to the runoff rate or volume
8. Adequately treat stormwater through the development and implementation of construction and post-construction BMPs to maintain existing water quality in Special Protection Waters
9. Ensure long-term operation and maintenance of BMPs

2. **Minimum Requirements.** To more specifically describe the requirements necessary to incorporate the design principles into the BMP design, the proposed regulations include minimum requirements. To address water quality issues related to stormwater runoff, the following requirements must be met:

- BMPs, either individually or cumulatively, shall be designed to remove at least 80% of the average annual post-development total suspended solids load
- BMPs shall remove the nutrient load to the extent feasible

The following requirements address the issue of rate and volume controls:

- Post-construction runoff hydrographs for the 2, 10, and 100 year storms shall be matched to the pre-development hydrographs for the same storm events; or post-development peak runoff rates shall be reduced to that of pre-development peak runoff rates for the 2, 10, and 100 year storm events and there shall be no increase in runoff volume from post-development to pre-development generated during the 2-year storm
- The annual average post-development recharge must equal the pre-development recharge
- Alternatives to post-development stormwater infiltration shall be used in areas of limited soil capability due to site conditions

3. **Implementation.** Another proposed change in the *Regulations* concerning the NPSPCP is a requirement to address implementation. The applicant must demonstrate that the requirements of the NPSPCP will be implemented either directly by them or through enactment of municipal ordinances. The municipal ordinances must be adopted prior to Commission approval of the NPSPCP.

The current project by project approach has not addressed, on a large scale, non-point source pollution issues. For example, any project in the area that is below the DRBC review threshold is not required to have an NPSPCP. In the proposed regulations, a major emphasis is on encouraging the adoption of Area-wide Plans. Area-wide Plans would include any plan adopted on a municipal, multi-municipal, county, or watershed basis that includes strategies for managing, controlling, and abating non-point source pollution. The non-point source strategy included in the Area-wide Plan may be adopted by the Commission into the DRBC Comprehensive Plan. Projects that are located in an

area with an approved Area-wide Plan would not be required to submit a site-specific NPSPCP.

Concurrent with the revision of the antidegradation portion of the *Regulations*, DRBC is developing a guidance manual to assist applicants and watershed planners in complying with the Special Protection Water Regulations. The manual will give a detailed explanation on what is required by applicants when submitting an NPSPCP and complying with the design principles and minimum requirements. It will also aid those creating an Area-wide Plan for submission to DRBC for review and possible adoption into the DRBC Comprehensive Plan.

Partnering

The Commission strategy for encouraging the development of Area-wide Plans with a non-point source strategy includes partnering with the states, county soil conservation districts, county planning commissions, municipalities, and watershed associations.

The basin states are revising their stormwater programs. DRBC would like to have Memorandum of Agreements with the states to define the roles of the state and DRBC in implementing non-point source programs where jurisdiction is shared. The objective is to work with the states as they revise their stormwater requirements so that the state programs will be consistent with the stormwater control requirements described in the proposed regulations. If state programs reflect DRBC non-point source requirements, then the states can implement the DRBC requirements through their own programs, resulting in a reduction in regulatory effort.

DRBC is working with other agencies as well to implement the non-point source requirements. The county soil conservation districts review Erosion and Sediment Control Plans and could help with enforcement of the Area-wide plans. In Pennsylvania, county planning commissions help develop Act 167 Stormwater Management Plans and by working with them, DRBC can ensure that these plans meet the non-point source requirements. DRBC can adopt the Stormwater Management Plans into the DRBC Comprehensive Plan so that all projects in the geographic scope of the plan must comply with the plan requirements. This would assist the county planning commissions to ensure that projects will comply with the plan requirements and it allows DRBC to extend the geographic scope of the non-point source requirements beyond a project site and service area. For reviewable projects located in the geographic scope of the plan, DRBC would review the stormwater ordinance of the municipality in which the project is located to ensure that it reflects the plan requirements. By working with the municipalities who adopt ordinances for stormwater controls, DRBC can ensure that the ordinances will prevent stormwater runoff generated by new development from causing stream degradation. The stormwater ordinances would result in DRBC requirements being applied to projects that are below the DRBC review threshold.

DRBC also plans to partner with watershed associations that are developing watershed plans containing a strategy for controlling non-point source pollution. Local watershed associations are valuable partners as they have a great deal of knowledge about the issues

affecting their watershed and can provide education/outreach in the watershed to promote practices that prevent degradation to the streams. They apply for grants for watershed planning efforts or to restore degraded waterbodies. They also conduct in-stream volunteer monitoring to alert government agencies of problems in the waterbodies. Watershed association's advocacy of an area's water resources throughout all regional planning efforts helps establish water resource elements in master plans, open space plans, and comprehensive regional plans.

Case Studies

1. **Broadhead/McMichaels Creek Watershed Stormwater Management Plan.** DRBC is currently involved in an Area-wide Plan with strategies to control non-point source pollution. The Monroe County Planning Commission has been updating the Act 167 Stormwater Management Plan for the combined Broadhead/McMichaels Creek Watershed. The Broadhead/McMichaels Creek Watershed Stormwater Management Plan provides a great example of an Area-wide plan containing a strategy for controlling non-point source pollution. If DRBC approves the plan, it would be the first Area-wide Plan adopted into the Comprehensive Plan and serve as the model for others wanting to create an Area-wide Plan. For this reason, DRBC has reviewed and offered comments on the draft plan.

The Plan includes the following objectives that coincide with DRBC design principles:

1. Maintain groundwater recharge
2. Implement non-point source pollution removal methodologies
3. Reduce channel erosion
4. Manage overbank flood events
5. Manage extreme flood events

The draft Model Act 167 Stormwater Management Ordinance provisions are sequenced to minimize stormwater impacts. The project design must first emphasize non-structural design alternatives including alternatives to surface discharge of stormwater, minimizing impervious surfaces, and maintaining the natural hydrologic regime of the site. Any remaining runoff must be treated prior to discharge and must comply with design requirements to control the rate, volume, and quality of the stormwater discharge. These requirements include a groundwater recharge component with water quality BMPs required prior to infiltration. They also require BMPs to detain the post-development 2, year, 24-hour design storm to the pre-development 1-year design storm to prevent streambank erosion and for water quality control. The ordinance also contains requirements to control the runoff rates for the 2, 5, 10, 25, and 100-year storms to prevent flooding.

The concepts included in this plan related to land use impacts on water quality came from studies conducted during the Pocono Creek Pilot Project. The Pocono Creek Pilot Study stressed the relationship between stormwater control, groundwater recharge, stream quality, and land use. The partners included the Monroe County Conservation District, DRBC, the Monroe County Planning Commission, Villanova University, Broadhead Watershed Association, PADEP, Pennsylvania Fish and Boat Commission, Pennsylvania

Department of Transportation, and USGS. Just as the pilot project of which DRBC took part influenced the development of the Brodhead/McMichaels Creek Stormwater Plan, the work done by the Monroe County Planning Commission on the Stormwater Plan is a great help to DRBC's non-point source program.

2. **Mt. Pocono.** In addition to the Brodhead/McMichaels Creek Watershed Stormwater Plan having the potential to be the first Area-wide Plan adopted into the Comprehensive Plan, it also impacts a project requiring Commission approval in Mt. Pocono. The Mt. Pocono Municipal Authority has applied to DRBC for expansion of their wastewater treatment plant. Since the municipal authority does not have the authority to implement an NPSPCP, they must work with Mt. Pocono Borough to pass an ordinance to implement their plan. Since they are located within the Brodhead Creek Watershed and the county is updating the Act 167 Stormwater Management Plan, Mt. Pocono does not intend to create its own NPSPCP but instead adopt any model ordinances that comply with the Brodhead/McMichaels Creek Watershed Stormwater Management Plan. To receive project approval from DRBC, Mt. Pocono has an incentive to ensure that the stormwater ordinance they adopt complies with DRBC non-point source requirements. Since this project requires Commission approval, DRBC will review the ordinance for consistency with the Stormwater Plan if the Plan meets the minimum requirements.

Conclusion

One of the challenges DRBC faces in implementing the "no measurable change" policy in Special Protection Waters has been the control of non-point source pollution in the drainage area of those waters. Until now, the non-point source program has been implemented on a project-specific basis rather than using area-wide approaches, which are believed to have broader benefits. Through the addition of design principles that encourage low-impact development and non-structural BMPs and minimum requirements that control the rate, volume, and quantity of stormwater runoff generated by new development, DRBC will be able to more effectively protect the high quality waters of the basin. By encouraging the development of Area-wide Plans containing a non-point source strategy and through coordination efforts with the states, county soil conservation districts, county planning commissions, and watershed associations, DRBC will broaden the scope and effectiveness of the non-point source controls. This effort to combine planning, regulations, and design will help DRBC meet its goal of maintaining existing water quality in Special Protection Waters.

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